

A NEW SPECIES OF *PSEPHENUS* FROM MEXICO AND TEXAS (COLEOPTERA, DRYOPOIDEA, PSEPHENIDAE)

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The Genus *Psephenus* is represented in the eastern and central portions of the United States and adjoining portions of Canada by a single species, *P. herricki* (Murvosh, 1960), and in the western states by five species: *P. lanei* in Idaho (Blaisdell, 1923); *P. calaveras*, *P. falli*, *P. haldemani*, and *P. veluticollis* in California (Casey, 1893; Leech and Chandler, 1963). A distribution map provided by Murvosh in 1962 also indicates records for western and northeastern Oregon and for the northwestern corner of Wyoming. Those in western Oregon are probably *P. haldemani*. Those in northeastern Oregon and the Yellowstone region may well be *P. lanei*. The western species apparently need study and possible revision. We have had access to none of them. In Mexico, the genus has been represented to date by *P. palpalis* and *P. usingeri* in the southcentral region (Hinton, 1934), and by *P. haldemani* in Baja California (Horn, 1870).

A population of *Psephenus* exists in southwestern Texas and in the Mexican states of Tamaulipas, Nuevo Leon and San Luis Potosi which constitutes a hitherto undescribed species. The description follows.

Psephenus texanus Brown and Arrington, NEW SPECIES

Male (Figs. 1, 2)—Oblong-oval, moderately depressed, densely pubescent, brown to black, moderately shining above, often with a greenish bronze sheen; antennae brown to black, the first two segments often lighter; maxillary palpi testaceous to black, the terminal segment usually darkest; coxae fuscous; femora fuscous dorsally, usually testaceous ventrally; tibiae usually dark, each with an apically expanding light testaceous streak on its anterolateral surface; tarsi testaceous to almost black, the terminal segment darkest; tarsal claws usually light proximally, dark apically. In many specimens, the head and pronotum are black, the elytra brown, and the lateral margins of the elytra and the posterior margins of the abdominal sternites are testaceous to fuscous.

Head transverse; densely, minutely punctate; rather deeply concave; anterior (clypeal) margin raised, forming a prominent, medially-emarginate flange; eyes prominent, hemispherical; antennae eleven-segmented and reaching to or slightly beyond base of elytra, the first segment longest, the third next longest, the fourth and eleventh subequal and almost as long as the third, the fifth to tenth subequal; maxillary palpi about half as long as antennae, the first segment short, the second about three times as long as the first, the third somewhat shorter than the second, and the fourth about the same as the second, but slightly enlarged and flattened, with a glabrous anterior margin; mandibles rudimentary, often visible only upon dissection; labial palpi inconspicuous, white-tipped.

Pronotum transverse, convex, about one-third wider than long; apex arcuate, about half as wide as base; apical angles broadly rounded; sides strongly convergent anteriorly; base bisinuate; basal angles obtusely rounded, turned slightly inward; disk evenly and moderately convex or with a slight median longitudinal carina in posterior half; densely and minutely punctate.

Elytra densely and minutely punctate; sides slightly explanate, subparallel, evenly arcuate in posterior third to form rounded, slightly divergent apices; basal

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humeri prominent; disk moderately convex, becoming less convex posteriorly; scutellum about as wide as long, rounded posteriorly.

Fifth ventral abdominal segment broadly, arcuately emarginate medially, exposing even more deeply emarginate sixth segment; seventh segment often clothed with conspicuous pale hairs directed posteriorly; similar hairs on mid-ventral portions of fourth and fifth segments of some specimens.

The male genitalia exhibit a V-shaped median spicule (Fig. 5).

Tibiae and tarsi slender. Tarsal claws feebly toothed at base.



FIGURE 1. *Psephenus texanus* n. sp. Male, dorsal aspect. Length 4.8 mm.

FIGURE 2. *Psephenus texanus* n. sp. Male, ventral aspect. Length 4.8 mm.

Length 4.0-5.2 mm (type 4.9 mm); width across elytral humeri 1.7-2.4 mm (type 2.1 mm).

Female—Like male except as follows: antennae usually uniform in color; clypeal flange less prominent but with medial emargination noticeable; dorsal concavity of head shallower; antennae smaller, shorter, not quite reaching to base of elytra, less nearly serrate; maxillary palpi only about $\frac{2}{5}$ the length of antennae; only 6 abdominal sternites visible, the fifth being arcuately, shallowly emarginate medially. These sexual differences are typical of the genus.

Length 4.5-5.3 mm; width across elytral humeri 2.0-2.6 mm; greatest elytral width 2.4-3.2 mm at about apical $\frac{3}{5}$.

Holotype, male, in the Stovall Museum, University of Oklahoma, Norman. Type locality: San Felipe stream in Del Rio, Val Verde County, Texas, at an

elevation of about 300 meters. Collected on October 3, 1964 by H. P. Brown and C. M. Shoemaker. Paratypes: in the collection of H. P. Brown 7 males with same data as type (also 42 larvae); in the U. S. National Museum 6 males and 12 females (and 2 larvae) taken by F. C. Pratt at Kerrville, Texas 20 June 1907 and 1 male taken by Pratt at Devil's River, Texas 7 May 1907. Other specimens in the collection of H. P. Brown assigned to this species include: 3 larvae from Real Co., Texas; 1 adult from Uvalde Co., Texas; 6 adults, 254 pupae (the majority riddled by parasitic wasps; vide Brown, in press), 151 old "pupal shells" (carapaces of last larval instars beneath which pupation had occurred), and 345 larvae from the Rio Sabinas, Nuevo Leon, Mexico; 14 adults and 28 larvae from other localities in Nuevo Leon south of Monterrey; 2 adults, 53 larvae, and 3 old "pupal shells" from four rivers in Tamaulipas; 1 adult and 6 larvae from Rio Axtla south of Ciudad Valles, San Luis Potosi, Mexico. Elevations range from about 100 to 600 meters. Most of the streams contain travertine, which indicates a high calcium content in the water.

This species appears to be most closely related to *Psephenus herricki*, from which it differs most conspicuously in the appearance of the clypeus. When viewed in anterior aspect, the clypeus of *P. texanus* is much more prominent, the medial indentation being typically quite noticeable (Figs. 3, 4). This feature can be easily observed from above or below (Figs. 1, 2). Perhaps the genitalia provide even better distinguishing characteristics, the median penial spicule being V-shaped in *P. texanus*, whereas that of *P. herricki* is constricted between base and apex, and the base exhibits little if any indentation (Figs. 5, 6). More details of differences are presented in Arrington's dissertation (1966), in which *P. texanus* is referred to as "Species A" and is compared with *P. herricki*, *P. palpalis*, and *P. usingeri*.

The larva of *P. texanus* (Figs. 9, 10) is very much like that of *P. herricki* in appearance and behavior. During the day, larvae are found beneath stones in shallow, well-aerated, fast-flowing streams. In subdued light or darkness they move to the upper surfaces of the stones (beneath the water surface) to graze upon the encrusting algae, as described by West (1929). As larvae approach maturity, they tend to migrate to quieter water at the foot of a riffle or in pools between riffles, thence to the water's edge, then up among the damp stones to some suitable pupation site. The site selected may be anywhere from just above water level to several feet above water level. Most often the site is on a rather smooth surface on the under side of a stone, not in direct contact with soil. Clinging to the stone with its sharp claws, the larva appresses the edges of its flattened carapace to the substrate and becomes attached. Whether any secre-

LEGENDS FOR FIGURES

FIGURE 3. *Psephenus texanus* n. sp. Clypeus and labrum of male, anterior aspect. Clypeus stippled.

FIGURE 4. *Psephenus herricki*. Clypeus and labrum of male, anterior aspect. Clypeus stippled.

FIGURE 5. *Psephenus texanus* n. sp. Male genitalia, ventral aspect. Penial spicule stippled.

FIGURE 6. *Psephenus herricki*. Male genitalia, ventral aspect.

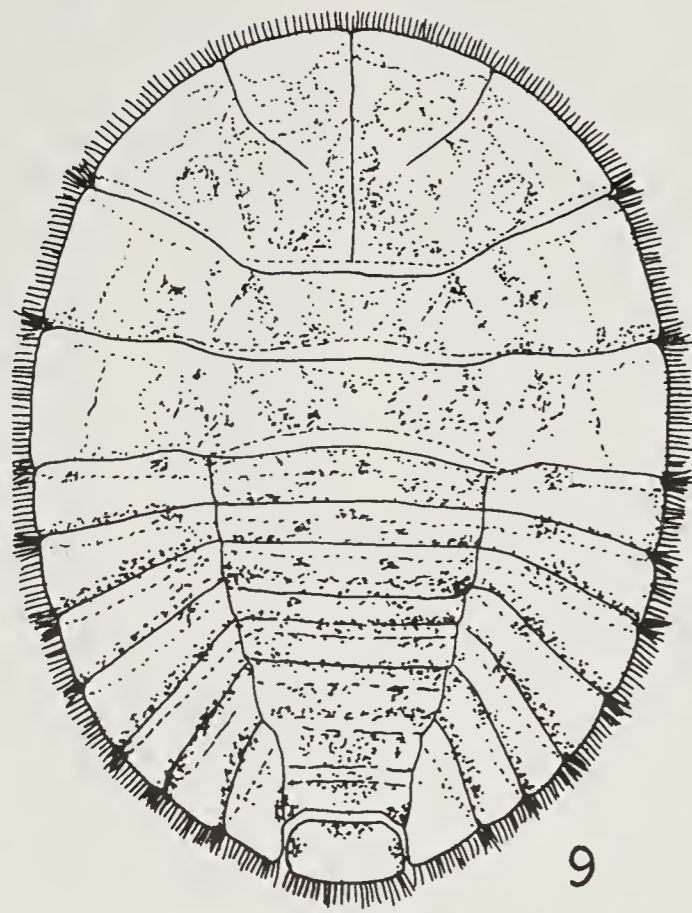
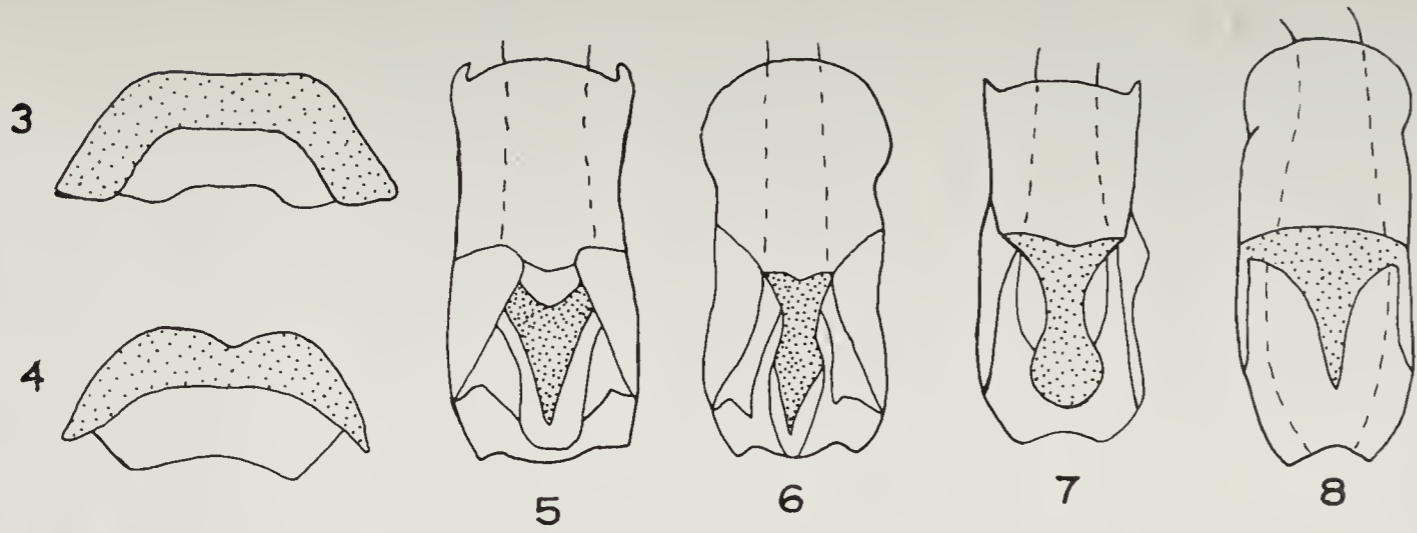
FIGURE 7. *Psephenus palpalis*. Male genitalia, ventral aspect.

FIGURE 8. *Psephenus usingeri*. Male genitalia, ventral aspect.

FIGURE 9. *Psephenus texanus* n. sp. Larva, dorsal aspect. Length 8.5 mm.

FIGURE 10. *Psephenus texanus* n. sp. Larva, ventral aspect. Length 8.5 mm.

FIGURE 11. *Psephenus texanus* n. sp. Pupa, ventral aspect, within last larval carapace. Length 8 mm.



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tion is involved in attachment we do not know, but the attachment is quite firm. Perhaps the only cementing agent is mud which hardens when the peripheral fringe of hairs is flattened against the substrate.

We do not know how long the prepupal larva waits before ecdysis; however, within a day or two pupation commences, the pupa remaining beneath the larval carapace (Fig. 11). Of two migrating larvae collected on 15 Dec., one emerged as an adult male on 28 Dec., the other on 29 Dec. Thus, although we do not know the precise duration of the pupal stage, we know that it was less than two weeks. The adult escapes by raising an edge of the sheltering larval carapace.

Although our collections date only from October to mid-December, we suspect that all stages occur throughout the year in regions blessed by year-round mild temperatures. In the northernmost portion of its range, *P. texanus* probably overwinters in the larval stage, as does *P. herricki*.

The following key is, of necessity, based chiefly upon male specimens. Couplets 6-8 are taken from Leech and Chandler (1963), who suggest that couplet 6 may prove to concern a sexual character.

KEY TO NEARCTIC AND MEXICAN SPECIES OF *Psephenus*

1. Dorsal concavity of head divided by a median longitudinal ridge; California..... *P. HALDEMANI* Horn 1870
- Dorsal concavity of head not divided..... 2
2. Sides of pronotum strongly convergent, the apex not more than about half as wide as the base..... 3
- Sides of pronotum feebly convergent, the apex at least two thirds as wide as the base..... 6
3. Male: antennae reaching to base of elytra; clypeus and frons forming a prominent, medially emarginate flange which projects antero-dorsally (Figs. 1-3); median penial spicule V-shaped (Fig. 5); Texas, Nuevo Leon, and Tamaulipas..... *P. TEXANUS* Brown and Arrington
- NEW SPECIES**
- Male: antennae not reaching elytra; clypeo-frontal flange, if present, not as above; median penial spicule not V-shaped..... 4
4. Male: maxillary palpi about half as long as antennae; second segment of maxillary palp not as long as third and fourth combined; Nova Scotia to Oklahoma..... *P. HERRICKI* (DeKay) 1844
- Male: maxillary palpi at least two thirds as long as antennae; second segment of maxillary palp usually longer than third and fourth combined; Mexico..... 5
5. Male: maxillary palp three quarters length of antenna; apex of median penial spicule enlarged and bluntly rounded (Fig. 7).....
- P. PALPALIS* Champion 1913
- Male: maxillary palp about two thirds length of antenna; apex of penial spicule acute (Fig. 8)..... *P. USINGERI* Hinton 1934
6. Pronotum velvety black..... 7
- Pronotum dull and opaque, not velvety..... 8
7. Pronotal sides evenly and feebly arcuate from base to apex; pronotal punctures rather strong and dense anteriorly, becoming finer and sparse behind; California..... *P. VELUTICOLLIS* Casey 1893
- Pronotal sides straight or feebly sinuate in middle two-fourths, anteriorly arcuately continuous with the rounded apical angles, apex arcuate; la-

- brum impressed at middle; pronotal punctures scarcely recognizable (female); California.....P. CALAVERAS Blaisdell 1923
8. Pronotal sides broadly rounded and subparallel toward base, more convergent and more nearly straight anteriorly, apex truncate; elytra with impressed lines, disc feebly elevated along the suture (male); southern California.....P. FALLI Casey 1893
- Pronotal sides broadly arcuate, somewhat broadly feebly sinuate at middle, apex arcuate; elytra without impressed lines, not elevated along suture in male; Idaho.....P. LANEI Blaisdell 1923

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LITERATURE CITED

- ARRINGTON, RICHARD JR. 1966. Comparative morphology of some dryopoid beetles. Doctoral Dissertation, The University of Oklahoma, Norman.
- BLAISDELL, FRANK E. SR. 1923. Two new species of *Psephenus* Hald., with a note on *Narpus angustus* Casey (Coleop.). Ent. News 34: 234-238.
- BROWN, HARLEY P. In press. *Psephenus* (Coleoptera: Dryopoidea) parasitized by a new chalcidoid; (Hymenoptera: Eulophidae). II. Biology of the parasite. Ann. Entomol. Soc. Amer.
- CASEY, THOS. L. 1893. Coleopterological notices. V. Ann. N. Y. Acad. Sci. 7: 281-606.
- CHAMPION, G. C. 1913. Notes on various Central American Coleoptera, with descriptions of new genera and species. Trans. Ent. Soc. London 1913: 58-169, Pl. III.
- HINTON, HOWARD E. 1934. *Psephenus usingeri*, n. sp. from Mexico with notes on the regional *Ps. palpalis* (Coleoptera, Psephenidae). Ann. Entomol. Soc. Amer. 27 (4): 616-618.
- HORN, GEO. H. 1870. Synopsis of the Parnidae of the United States. Trans. Amer. Entomol. Soc. 3: 29-42.
- LEECH, H. B. AND H. P. CHANDLER. 1963. Aquatic Coleoptera, p. 293-371. In Robert L. Usinger (ed.), Aquatic Insects of California, Univ. Calif. Press, Berkeley and Los Angeles.
- MURVOSH, CHAD M. 1960. An ecological study of the riffle beetle *Psephenus herricki* (DeKay) (Coleoptera: Psephenidae). Doctoral Dissertation, The Ohio State University, Columbus.
- WEST, LUTHER S. 1929. Life history notes on *Psephenus lecontei* Lec. (Coleoptera; Dryopoidea; Psephenidae). Battle Creek College Bull. 3 (1): 3-20, Pls. I-III.

CURRENT LITERATURE

Halffter, G. and Mathews, E. G., 1966. The Natural History of Dung Beetles of the subfamily Scarabaeinae (Coleoptera, Scarabaeidae). Folia Entomologica Mexicana, no. 12, 312 pp., 52 figs.

This book is a comprehensive summary of the biology of dung beetles including a review of the available literature, the incorporation of a great amount of original data, and a masterful synthesis of these facts to show evolutionary trends.

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